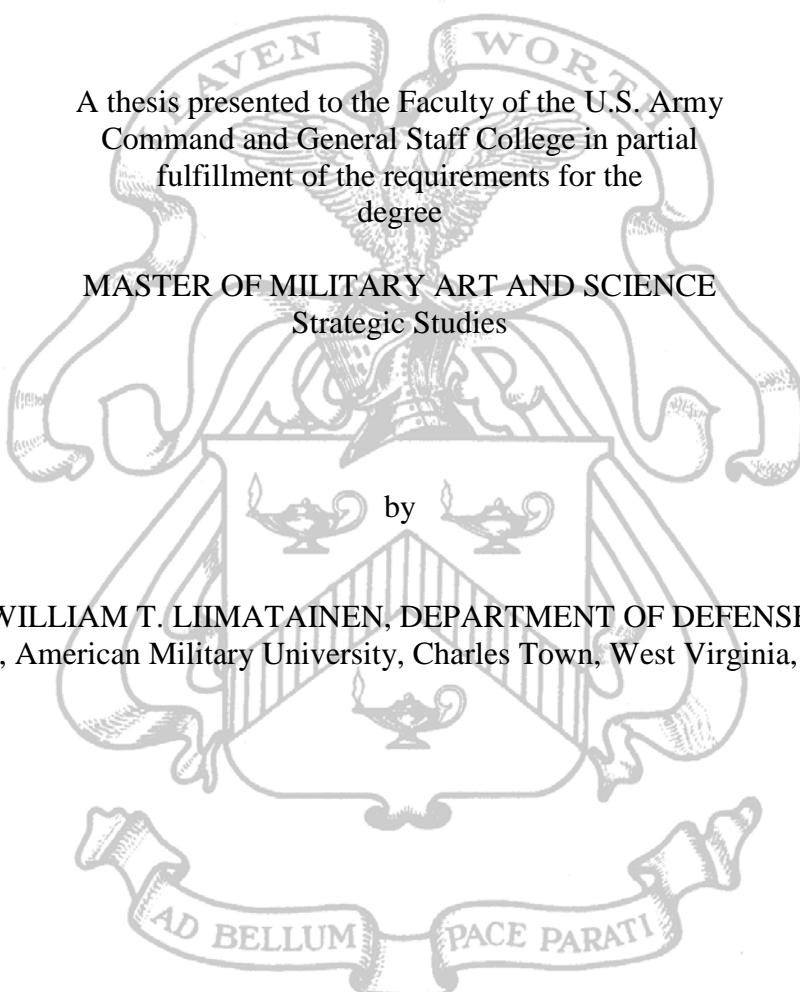# CONSIDERATIONS FOR U.S. POLICY TOWARD CONVENTIONAL ARMS MANUFACTURERS IN POST-CONFLICT OR FAILED-STATE ENVIRONMENTS

A thesis presented to the Faculty of the U.S. Army
Command and General Staff College in partial
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MASTER OF MILITARY ART AND SCIENCE
Strategic Studies

by

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U.S. policy toward weapons' manufacturers in post-conflict and failed-state environments has been historically inconsistent. In post-WWII Germany, policy focused on dismantling weapon's factories and recruiting scientists and engineers. In the Former Soviet Union, policy focused on destruction of weapons of mass destruction, defense conversion, and redirection of weapon's scientists to peaceful endeavors to prevent proliferation. In post-2003 Iraq, U.S. policy focused exclusively on preventing the proliferation of those with experience working in weapons of mass destruction programs. No effort was made to convert defense industrial facilities to civilian production, resulting in the unemployment of 60,000 Iraqis who had worked there. With the increasing global threat posed by non-state actors and their use of improvised weapons, the world can no longer afford to ignore the fates of defense industrialists in post-conflict or failed-state environments. The market for their expertise has grown substantially and unemployment puts them at risk for recruitment. The U.S. should consider one of two options to address this issue: (1) expand current Cooperative Threat Reduction programs to include conventional arms experts, or (2) create a new program designed to offer those at risk an alternative to providing their expertise to insurgents, terrorists, and criminal organizations.

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ABSTRACT

CONSIDERATIONS FOR U.S. POLICY TOWARD CONVENTIONAL ARMS
MANUFACTURERS IN POST-CONFLICT OR FAILED-STATE ENVIRONMENTS,
by William T. Liimatainen, 67 pages.

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organizations.

ACKNOWLEDGMENTS

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ACRONYMS

CPA	Coalition Provisional Authority
CTR	Cooperative Threat Reduction
FSU	Former Soviet Union
IED	Improvised Explosive Device
MIC	Military Industrialization Commission
NAS	National Academy of Sciences
STE	Scientists, Technicians, and Engineers
WMD	Weapons of Mass Destruction
WWII	World War II

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CHAPTER 1

INTRODUCTION

> Make no mistake: the outcome of war was now decided, as much as anything, by a nation's scientific and engineering wizards. This was the lesson of World War II. The laboratory, as much as the factory, proved to be the great arsenal of democracy. Radar. Missiles. Radio-controlled fuzes. Mass-produced penicillin. The atomic bomb. Never had a nation at war harvested the knowledge of its people on such a grand scale. Never had scientists and engineers so altered the face of battle.
>
> —G. Pascal Zachary, *Endless Frontier; Vannevar Bush: Engineer of the American Century*

The above quote eloquently describes how important the scientist and engineer became to a nation's war-making capability during World War II (WWII). While technological improvements related to war date back hundreds of years (the longbow, gunpowder, and the artillery fortress are good examples), WWII saw this occur at unprecedented levels. The United States mastery of the atomic bomb represents the most obvious example of advances in military technology during that period. However, in many respects, Germany's defense industry was well ahead of the victorious allies; their advances in missile technologies, for example, were unrivaled at the time.[1] It is thus unsurprising that in the aftermath of the war, the former allies competed for German weapons' technology and the services of German scientists, technicians, and engineers (STE). The competition between the United States and the Soviet Union over German STE was seen not only as a means of securing an edge in military technology, but also as a means of denying such technology to the opposing side.[2]

United States efforts to secure German expertise are well documented. The Alsos mission focused on securing German nuclear technologies, while Operation Paperclip

focused on a wide range of technologies; under Paperclip, top German STE were brought to the United States.[3] Here, Wernher Von Braun-a German missile expert who led the V2 missile design effort during war-stands out as one of the top acquisitions by the United States.[4] Yet Paperclip and Alsos do not stand alone as the postwar policies of the United States toward German science. Shortly before the end of the war in the European theater, the National Academy of Sciences (NAS) was asked to give its recommendations for postwar policy toward German scientists employed in defense industry. A panel, led by world-renowned organic chemist Roger Adams, was tasked by the Office of Scientific Research and Development to provide recommendations on the treatment of German science in the post-conflict environment.[5] While this is discussed in further detail in the following chapter, it is important to note that Alsos, Paperclip, and the NAS study all point towards the importance that Washington placed on German military research in the aftermath of the war.

Decades after Paperclip, Alsos, and the NAS study, Washington once again had concerns over the fate of weapons' manufacturing STE. As the Soviet Union was collapsing in 1991, U.S. Senators Sam Nunn and Richard Lugar recognized the threat posed by orphaned weapons' design and production facilities and suddenly unemployed STE with dangerous knowledge. A host of countries with less-developed defense industrial capabilities would look at Soviet experts with an interest in recruiting them. To address these threats, the senators crafted legislation which was later passed by Congress and implemented under what is known as Cooperative Threat Reduction (CTR). A multi-faceted approach to address the Soviet weapons' threat, CTR included efforts to secure design and production facilities; destroy Weapons of Mass Destruction (WMD) and their

associated delivery systems; redirect scientists and engineers to peaceful employment; and convert defense industrial infrastructure to civil production lines (emphasis was placed on facilities involved in WMD research, development, and production). CTR efforts in the former Soviet Union are discussed in further detail in the following chapter.[6]

History repeated itself once again a little more than a decade after the Soviet Union's collapse. When the United States invaded Iraq in 2003, Saddam Hussein's Military Industrialization Commission (MIC) employed some 60,000 personnel in weapon's research and production. Clearly, they did not constitute the same threat, as did the German and Soviet STE of years past; Iraq's defense industry was nowhere near the peer of its historical counterparts in Germany and the Former Soviet Union (FSU). However, Iraqi expertise was clearly of value to nations aspiring to develop military production capabilities, and perhaps more importantly, non-state actors looking to expand their improvised weapons' production capabilities.[7] As will be discussed later, a State Department-led project to develop postwar plans for Iraqi STE commenced as early as 2001; however, National Presidential Security Directive 24 broke with tradition and placed the Department of Defense in charge of post-conflict operations in Iraq. This ultimately led to the demise of postwar plans for Iraq's defense industrialists. Left unemployed, with little hope for the future, they were in a position where non-state actors could recruit them in return for a means of feeding their families.

This manuscript examines an important question facing current and future policymakers and Presidential administrations: What responsibility does the United States have in planning and implementing programs to address the post-conflict/failed-

state disposition of those with conventional weapons' manufacturing expertise? As noted above, discussion will begin with historical examination of United States policies and actions on this topic. From this departure point, discussion will shift to where such planning will be relevant in the future, with particular attention paid to Iran.

Those familiar with contemporary CTR programs might suggest that the United States already has the requisite expertise to address any future contingencies related to disenfranchised weapons' experts. However, this manuscript argues that today's new threat goes beyond the original purpose of the CTR. CTR was to focus on the threat posed by the potential for proliferation of WMD and associated expertise. This was for obvious reasons; the catastrophic consequences associated with an irrational actor (state or non-state) in possession of WMD was a risk the world could not afford to take. What we face now is not just the potential for proliferation of WMD and associated expertise, but also conventional weapons' manufacturing expertise. There is a reason, after all why the acronym Improvised Explosive Device (IED) has become as widely recognized over the past decade as that of WMD; it is precisely because non-state actors have acquired the expertise to produce improvised weapons on a level unseen in the past. As will be discussed in greater detail later, *New York Times* journalist Chris Chivers has reported extensively on the demand for conventional arms-manufactuing expertise by rebels in countries such as Libya and Syria following the Arab Spring.[8] Violent Islamic extremist organizations have similarly shown high demand for such expertise.[9] If such expertise is to be denied to such organizations in the future, the United States and its allies will need to take an active role in developing a strategy to combat this growing trend. With this in mind, policymakers should consider the expansion of current CTR initiatives to address

the threat posed by the proliferation of conventional weapons' manufacturing expertise in post-conflict/failed-state environments. Although nonproliferation officials may initially resist taking on this added responsibility, there is no other existing program more suited to address this threat.

[1]Anatoly Zak, *History: German Research in the Field of Rocketry and Space Flight (1920-1945),* RussianSpace Web.com, http://www.russianspaceweb.com/rockets_wwII_germany.html (accessed February 16, 2014).

[2]Michael J. Neufeld, "Overcast, Paperclip, Osoaviakhim: Looting and the Transfer of German Military Technology" in *The USA and Germany in the era of the Cold War 1945-1990,* ed. Detlef Junker (Cambridge, UK: Cambridge University Press, 2004).

[3]Ibid.; The Manhattan Project Heritage Preservation Association, Inc., "The ALSOS Missions," Atomic Heritage Foundation, http://www.mphpa.org/classic/HISTORY/H-06f.htm (accessed February 16, 2014).

[4]Andrew Walker, "Project Paperclip: Dark Side of the Moon," *BBC News*, November 21, 2005, http://news.bbc.co.uk/2/hi/uk_news/magazine/4443934.stm (accessed February 16, 2004).

[5]William T. Liimatainen, "Nonproliferation Before Nunn-Lugar: The Adams-Kelly Model," *Arms Control Today*, September 2013, https://www.armscontrol.org/act/2013_09/Looking-Back-Nonproliferation-Before-Nunn-Lugar-The-Adams-Kelly-Model (accessed February 16, 2014).

[6]Defense Threat Reduction Agency (DTRA) and USSTRATCOM Center for Combating WMD and Standing Joint Force Headquarters-Elimination, "Nunn-Lugar Global Cooperation Initiative," http://www.dtra.mil/Missions/nunn-lugar/nunn-lugar-home.aspx (accessed February 16, 2014).

[7]Peter D. Smallwood and William T. Liimatainen, "Securing WMD Expertise: Lessons Learned from Iraq," *Arms Control Today*, July-August 2011, http://www.armscontrol.org/act/2011_%2007-08/%20Securing_WMD_Expertise_Lessons_Learned_From_Iraq (accessed February 16, 2014).

[8]Christopher Chivers, "Syria's Dark Horses, With Lathes: Makeshift Arms Production in Aleppo Governorate, Part I," *New York Times At War Blog*, September 19, 2012, http://atwar.blogs.nytimes.com/2012/09/19/syrias-dark-horses-with-lathes-makeshift-arms-production-in-aleppo-governorate-part-i/?_php=true&_type=blogs&_r=0 (accessed February 16, 2014); Christopher Chivers, "Hidden Workshops Add to Libyan

Rebels Arsenal," *New York Times*, May 3, 2011, http://www.nytimes.com/2011/05/04/world/africa/04misurata.html?pagewanted=all (accessed February 16, 2014).

[9]Smallwood and Liimatainen.

CHAPTER 2

LITERATURE REVIEW

> As is the case with smuggling nuclear materials, the unsuccessful attempts to smuggle missile expertise are more visible than the successful ones. One such case showed that this problem is not purely hypothetical. In December 1992, over 50 Russian rocket scientists from the leading Makayev Design Bureau were arrested at Moscow's Sheremetyevo Airport, en route to North Korea where they had been offered astronomical (to the Russians) salaries.
> ─U.S. Congress, Office of Technology Assessment,
> *Proliferation and the Former Soviet Union*

Before attempting to answer any questions related to future responsibility to engage conventional arms manufacturers in post-conflict/failed-state environments, it is worth exploring previous instances where Washington faced this dilemma—to establish historical precedent. This manuscript begins with a brief look at available literature that addresses this topic in three case studies: post-WWII Germany, the Soviet Union after its collapse in the early 1990s, and post-2003 Iraq.

Post-WWII Germany

In the final months leading up to the Allied victory in Europe, the United States became increasingly concerned with German defense industrial expertise falling into the hands of potential future adversaries. Washington recognized that acquisition of such expertise would be of critical importance to future development of defense industrial capability and the national security of the United States (should the Soviet Union acquire such expertise). With this in mind, two secret United States missions—Alsos and Paperclip—were launched to acquire the secrets of the German defense industry. Under

these programs, Washington hoped to capture German military research and secure the services of Germany's top weapons' STE.[1]

Far less well known is that in addition to implementing Alsos and Paperclip, Washington had also called for an independent assessment on the treatment of post-war science in Germany. This resulted in the creation of a NAS panel led by Roger Adams, an organic chemist employed at the University of Illinois. The panel consisted exclusively of leading civilian scientists, who reported their findings to the Office of Scientific Research and Development—an organization created during the war to rally United States science and technology behind the war effort.[2] The panel's report presented three options on the treatment of German science in the post-war period. Of those three, the panel argued for the least restrictive, as they recognized the important role that science had to play in Germany's economic recovery. Although the panel agreed unanimously that German research of a military nature should be restricted, they also agreed that peaceful research should "be allowed to expand at a pace commensurate with the country's recovery."[3]

Although the Office of Scientific Research and Development approved the report, and it was delivered to the Foreign Economic Administration, historian Rexmond Cochrane notes that the report was "quietly buried shortly after its appearance."[4] It is unclear why and how the report was buried. However, it is widely known that there were serious disagreements in Washington over post-war policies on German science. The two central characters within Franklin D. Roosevelt's administration who were at odds on such policies were Treasury Secretary Henry Morgenthau and Secretary of State, Cordell Hull. Morgenthau stated his case in his book, *Germany is Our Problem*, while Hull's memoirs provide an excellent account of where he disagreed with Morgenthau and why.

It is worth briefly summarizing both sides of the argument, for even some 60 years later in Iraq the argument remained relevant to post-war policies on foreign defense industrial programs.

At the beginning of chapter 2 in *Germany is Our Problem*, Morgenthau stated:

> My own program for ending the menace of German aggression consists, in its simplest terms, of depriving Germany of all heavy industries. The reason for selecting heavy industries is that with them Germany can quickly and terribly convert once more to war. Without them, no matter how savage her aggressive aims may be, she cannot make war.[5]

What is immediately evident in Morgenthau's plan is that not only did he support the dismantling of all defense industry, but that all of Germany's heavy industry should similarly be dismantled. This included strategic industries, which he referred to as "a triple threat of metallurgical, chemical, and electrical industries."[6] He argued that the capability to manufacture machine tools, airplane engines, airplanes, locomotives, heavy railroad equipment, diesel engines, tractors, automobiles, virtually all chemicals, communication devices, and electronic equipment should be eliminated.[7]

Cordell Hull saw Morgenthau's plans as harsh and ill advised. Hull stated so in his memoirs:

> It was obvious on its face that this plan was drastic. It would leave Germany with practically no industry, and would force the population to live entirely on the land, regardless of the fact that there was not enough land on which the large German population could live. Essentially, this was a plan of blind vengeance. It was blind because it failed to see that, in striking Germany, it was striking at all of Europe. By completely wrecking the German industry it could not but partly wreck Europe's economy, which had depended for generations on certain raw materials that Germany produced.[8]

Not only did Hull believe that the de-industrialization of Germany would cripple Western Europe, but he also saw Morgenthau's plan as failing to set the conditions for democracy and suggested that the plan "was a scheme that would arouse the eternal

resentment of the Germans."[9] Despite Hull's objections, Roosevelt approved the Morgenthau Plan at the Second Quebec Conference. Hull later wrote that this may have been the low-point of his career and that if details of the plan leaked out it could "well mean a bitter-end to German resistance that could cause the loss of thousands of American lives."[10]

One can only speculate as to why the NAS recommendation of a less restrictive policy on German science was buried. This is not sufficiently explained anywhere in literature reviewed for this study. However, given political disagreements in Washington over this topic, it is plausible to believe that those who favored the Morgenthau plan viewed the NAS report as unfavorable and contrary to their views. Ultimately, United States policies in Germany consisted early on of capturing expertise and eliminating industrial capability. Later, when it became clear that United States policies were devastating the West German economy, revisions to the Level of Industry Plan (which had initially put severe restriction on production of strategic materials such as steel) were made, allowing an increase in production levels.[11] At this point, many of the top German weapons' STE had been recruited abroad, eliminating the potential for them to be converted to civil production programs.

<u>Nunn-Lugar Legislation and the FSU</u>

The collapse of the Soviet Union a little more than two decades ago created a proliferation risk unrivaled in scale since the WWII. Suddenly, hundreds of defense industries and associated research and development facilities were in a precarious position, with no government funded projects and hundreds-of-thousands of under-employed or unemployed workers. Washington was quick to recognize this problem and

Senators Sam Nunn and Richard Lugar drafted legislation—eventually passed by

Congress—to address this issue. Nunn and Lugar's legislation eventually became known

as CTR). Under CTR, a number of programs were created to address abandoned

weapons' facilities, destroy WMD, and redirect weapons scientists and engineers to

peaceful employment.[12] The success of such programs varied greatly and is the subject of

much study by historians, policymakers, nonproliferation officials, and associated think

tanks. As this manuscript examines this issue further, it is important to remember that, for

the most part CTR was created to address WMD proliferation, with little focus on

conventional weapons and associated facilities and personnel.

Destruction/Safeguarding of WMD

By all accounts, the destruction of Soviet WMD marked the greatest success of

the Nunn-Lugar program. This is due primarily to the tangible metrics associated with the

destruction of a physical object. A running tally of such acts briefed extremely well to

members of Congress (see figure 1).[13]
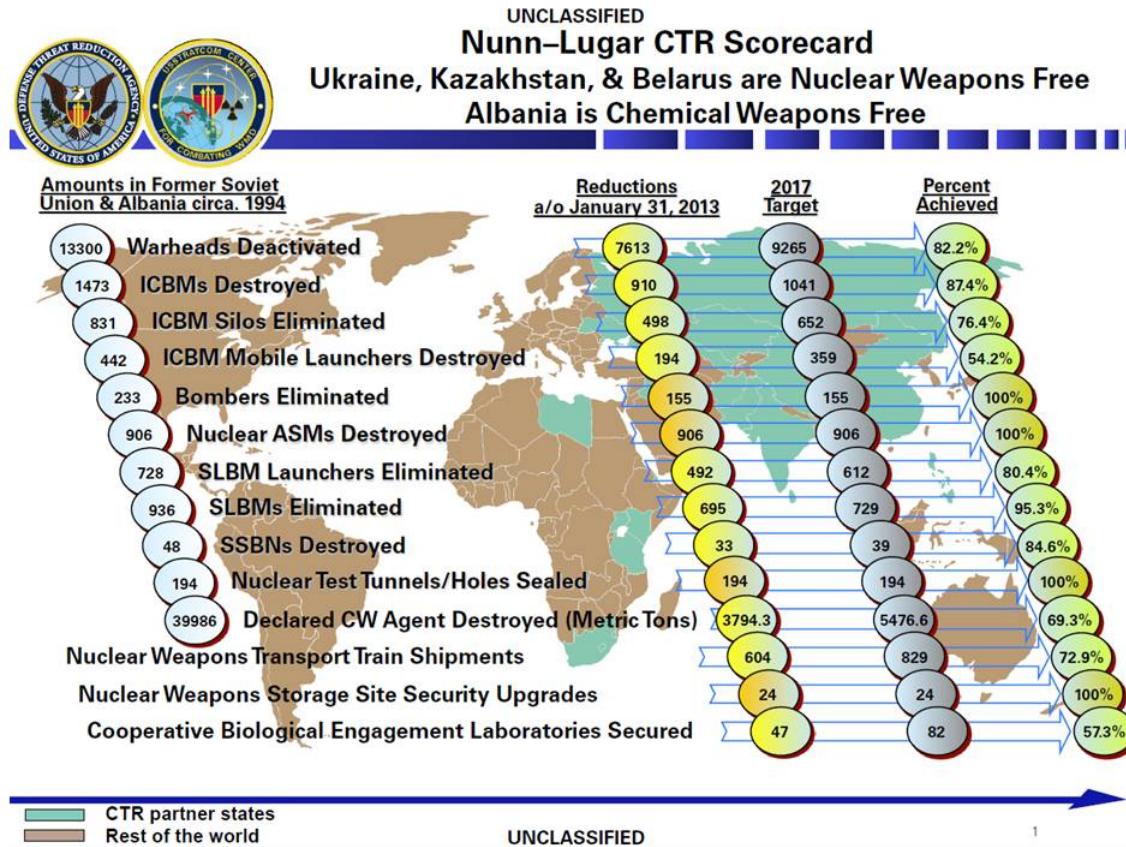
Figure 1.   Nunn-Lugar Scorecard

Source: Defense Threat Reduction Agency and USSTRATCOM Center for Combating WMD and Standing Joint Force Headquarters-Elimination, "Nunn-Lugar Scorecard," http://www.google.com/url?sa=t&rct=j&q=&esrc=s&frm=1&source=web&cd=2&ved=0 CCsQFjAB&url=http%3A%2F%2Fwww.dtra.mil%2Fdocs%2Fdefault-document-library%2F20130101_fy13_ctr-scorecard_slides_jan13.pdf%3Fsfvrsn%3D0&ei= JfoAU8ipFuewyQGSr4C4Cg&usg=AFQjCNEoMcf50Mi9YmF8hyl9pTVtQJ_n0A (accessed February 16, 2014).

Defense Conversion

The Defense Conversion program was created to help convert industries in the

FSU to commercial enterprises, focusing on those facilities involved in WMD

programs.[14] In 1997, the Government Accountability Office reviewed the performance of

the program and was unable to determine whether it had had any effect in reducing WMD production capability.[15] While this program received a fair amount of criticism due to its lack of effectiveness, one should not necessarily ignore the general concept of a similar program in the future. The major challenge to Defense Conversion in the FSU was the sheer size of the defense industrial complex. According to the Government Accountability Office report, at the end of the Cold War there were anywhere from 2,000-4,000 research, development, and production facilities focused on military projects in the FSU. These facilities employed an estimated 9-14 million people.[16] The money and time required to address a problem of this scale was beyond the means of the United States and perhaps even an international community.

Scientist Redirection

As opposed to the tangible measurement associated with the destruction of a warhead, scientist redirection is far more difficult to assess. This has been a repeated criticism of redirection initiatives over the past decade. Whereas the Nunn-Lugar Scorecard briefs well to Congress, a similar metric on the number of STE redirected to peaceful employment is not available. To be successfully redirected, STE needs to be placed in a position offering long-term employment and a sufficient salary, while being commensurate with the individual's skills, abilities, and interests. In virtually all cases, the private sector is unable to immediately absorb thousands of well-educated individuals in the workforce. At the same time, the host nation government has a limited capability and interest in paying unproductive individuals simply to keep them in the country. This was clearly the case in the former Soviet bloc countries.[17]

Post-2003 Treatment of Iraq's Military Industrialization Commission

In 2003, the United States invaded Iraq, and after a successful initial military campaign, became bogged down fighting an insurgency. Coalition Provisional Authority (CPA) Orders 1 (De-Ba'athification of Iraqi Society) and 2 (Dissolution of Entities) have been the focus of much criticism for their role in creating conditions under which the insurgency would develop.[18] These orders banned Ba'athists from future public sector employment, despite the fact that many had joined the Ba'ath Party to gain or maintain government employment, not for ideological reasons. Moreover, this put those with experience running a government out of work. Second, the orders eliminated the Iraqi Army; those who had served in Iraq's military were simply sent home. As has been well documented in literature examining the Iraq war, this was a dangerous recipe for the formation of an insurgency; those who had been in power, along with those who knew how to fight, were suddenly sent home with no prospects for the future.

Another CPA order passed in April 2004, which had significant repercussions. The Realignment of Military Industrial Companies (CPA Order 75)[19] effectively put the majority of Iraq's weapons' manufacturers out of work. Before further discussing CPA Order 75 and its impact, it is worth briefly summarizing the evolution and devolution of United States policies on Iraq's conventional arms production sector.

As early as 2001 (shortly after the September 11 World Trade Center attack), State Department officials in Foggy Bottom had begun to plan for post-war operations in Iraq. Tom Warrick, a State Department official, led a project that eventually became known as the Future of Iraq Study. Enlisting the help of prominent Iraqi expatriates, the project focused on addressing what would be needed in an eventual post-conflict

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environment.[20] Relevant to this discussion are the findings of the Defense Policy and

Institutions Working Group (which conducted a portion of the Future of Iraq Study). This

working group focused on postwar plans for Iraq's MIC (Saddam's ministerial-level

organization responsible for the production of conventional weapons). The working

group recognized that Washington could ill-afford to ignore MIC in a post-conflict

environment, as evidenced in their findings:

> Many institutes and factories of the Military Industry will be destroyed when the
> liberation of Iraq from the present regime is complete. But its members and
> scientists will still be there. It is important to see that the Iraqi Military Industry
> transform itself to civil use. Scientists that can produce Mustard Gas can very well
> produce medicine. And experts in rocket technology can one day build aeroplanes
> and trains. . . . There should be an effort to make enterprises involved in military
> manufacturing equipment operate according to their productive capabilities. The
> programs of the enterprises should be defined according to Iraq's defensive needs.
> All excess production capacity should be turned into civilian productive
> enterprises.[21]

Although many details were lacking, the Defense Policy and Institutions Working

Group made several important observations. First it accurately predicted that although

MIC might be dissolved as an operating entity (or drastically reduced in size), its

scientists and engineers would be left without employment. Second, it recognized the

potential value of these individuals to the development of Iraq during the post-war period.

Finally, it recognized that some defense industrial capability would need to be preserved

to meet Iraq's defensive needs. Unfortunately, much like the NAS report from WWII, the

report was shelved and its recommendations never received the attention they deserved.

Because of National Security Presidential Directive 24, the Department of

Defense was given responsibility for post-conflict operations in Iraq. This broke with

tradition, as this phase is typically given to the Department of State. Because of the

directive, the Defense Department established the Office of Reconstruction and

Humanitarian Assistance, with General Jay Garner tapped to lead the organization. Shortly after taking the reins of Office of Reconstruction and Humanitarian Assistance, Garner held a meeting at the National Defense University to go over all post-war planning conducted to date. It was at this meeting where Warrick would highlight much of the work that he and his team had already done. Garner was impressed and hired Warrick on the spot. With Warrick now part of the Office of Reconstruction and Humanitarian Assistance team, it seemed increasingly likely that MIC would get the attention it deserved, as identified by the Defense Policy and Institutions Working Group. However, this was not to be.[22]

Sometime after the meeting at the National Defense University, Secretary of Defense Rumsfeld asked Garner if he had a guy named Warrick working for him. When Garner responded in the affirmative, Rumsfeld told him that Warrick needed to be fired and that this was not negotiable. It was later explained that Warrick was fired because he did not support the plan to install Ahmad Chalabi as the new President of Iraq.[23] With Warrick out, the recommendations for MIC (as laid out in the Future of Iraq Study) had little chance for implementation.

It would not be until April 2004—a year after the invasion—that the CPA would address Iraq's defense industries. In the meantime, both organized and opportunistic looting had devastated many MIC facilities (in some cases plants were torn completely to the ground). A team of CPA officials went to inspect MIC factories, to see which remained viable. Under CPA Order 75, viable MIC facilities were transferred to other Iraqi ministries (the Ministry of Industry and Minerals, for example), while non-viable facilities were transferred to the Ministry of Finance. Under the Ministry of Finance,

employees of non-viable companies received a fraction of their former salaries (akin to a welfare payment) and had no work to do.[24] Ultimately, almost 50,000 out of 60,000 total employees suffered this fate (see table 1).

Table 1.   Companies Assigned to the Ministry of Finance Under CPA Order 75

Enterprise Name	Area of Activity	Total Number Workers
Tareq	Pesticides, chemicals	896
Hammurabi	Pistols, small arms	636
Ibn Waleed	Heavy armored vehicle repair	926
Al Rasheed	CO2 producer, mechanical	2,290
Asahf al Kabir	Concrete additives	86
Al Uboor	Mechanical machining	1,217
Radwhan	Machining	760
Al Nidaa	Dies, molds, gears	1,281
Jaber ben Hayan	Plastic, rubber, filters	904
Yarmuk	Ammunition, barbed wire	2,708
Al Ezz	Electronic switching	1,046
Al Kadissiya	Guns, grenades, mortars	3,035
Al Fidaa	Hyrdraulic, pneumatic systems	1,285
Al Karama	Missiles, mechanical	2,287
Al Qaqa	Explosives, powder, TNT	5,365
Bader	Tools, dies	1,631
Tabook	Powder for cartridges	532
Al Hadhar	Chemical products	572
7 Nissan	Fuses, military shells	2,652
Al Hareth	Radars, welding equipment	1,387
Al Kindi	R&D radars	976
Sanahareeb	Irrigation systems	675
Salahuddeen	Communications, radars	2,900
Ibn Rushd	QA, testing, inspection	448
Hutten	Ammunition, guns, mortars	5,473

Source: Administrator, Coalition Provisional Authority, Coalition Provisional Authority Order Number 75, "Realignment of Military Industrial Companies," http://www.iraq coalition.org/regulations/20040420_CPAORD_75_Realignment_of_Military_Industrial_ Companies_with_Annex_A.pdf (accessed February 16, 2014).

Suddenly, an environment had been created in which an insurgency was developing and frustrated individuals with dangerous expertise were available for hire. Not only did they need to continue to feed their families, but also they could justify their actions by the belief that the Americans had sat around and done nothing to protect their factories and livelihoods.

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[1]Neufeld.

[2]Liimatainen.

[3]Ibid.

[4]Rexmond C. Cochrane, *The National Academy of Sciences: The First Hundred Years, 1863-1963* (Washington, DC: National Academy of Sciences, 1978), 428.

[5]Henry Morgenthau, *Germany is Our Problem: A Plan for Germany* (New York: Harper and Brothers Publishers, 1945), 16.

[6]Ibid., 17.

[7]Ibid., 18-19.

[8]Cordell Hull, *The Memoirs of Cordell Hull, Volume II* (New York: The Macmillan Company, 1948), 1605-1606.

[9]Ibid., 1611.

[10]Ibid., 1614.

[11]German History in Documents and Images, "Volume 8. Occupation and the Emergence of Two States, 1945-1961, Revised Plan for Level of Industry in the Anglo-American Zones (August 29, 1947)," German Historical Institute, http://www.google.com/url?sa=t&rct=j&q=&esrc=s&frm=1&source=web&cd=1&cad=rja&ved=0CCQQFjAA&url=http%3A%2F%2Fgermanhistorydocs.ghi-dc.org%2Fpdf%2Feng%2FEcon%2520WZFR%25206%2520ENG.pdf&ei=SfgAU975JMfQyAGl4oCwDA&usg=AFQjCNEnLub0xjLPcV4RyxJdnmL-qhUUqA (accessed February 16, 2014).

[12]DTRA and USSTRATCOM Center for Combating WMD and Standing Force Headquarters-Elimination, "Nunn-Lugar Global Cooperation Initiative."

[13]DTRA and USSTRATCOM Center for Combating WMD and Standing Force Headquarters-Elimination, "Nunn-Lugar Scorecard."

[14]U.S. General Accounting Office, GAO/NSIAD-97-101, Report to the Chairman, Committee on National Security, House of Representatives, *Cooperative Threat Reduction: Status of Defense Conversion Efforts in the Former Soviet Union*, April 11, 1997, http://www.gao.gov/products/NSIAD-97-101 (accessed February 16, 2014).

[15]Ibid.

[16]Ibid.

[17]Smallwood and Liimatainen; Brian D. Finlay and Elizabeth Turpen, The Henry L. Stimson Center Report No. 67, "Manufacturing Possibility: Expanding Resources to Meet Global Challenges, Promote Economic Development, Support Innovation, and Prevent Proliferation," April 2008, Stimson Center, http://www.google.com/url?sa=t&rct=j&q=&esrc=s&frm=1&source=web&cd=17&cad=rja&ved=0CE8QFjAGOAo&url=http%3A%2F%2Fwww.stimson.org%2Fimages%2Fuploads%2Fresearch-pdfs%2FManufacturing_Possibility.pdf&ei=_vsAU5_aNYa6yQHBgoCQDw&usg=AFQjCNEGbPhwadrgTGe_TgIcPwUuznkaHw (accessed February 16, 2014).

[18]James P. Pfiffner, "U.S. Blunders in Iraq: De-Baathification and Disbanding the Army," *Intelligence and National Security* 75, no. 1 (February 2010); James P. Pfiffner, George Mason University, http://www.google.com/url?sa=t&rct=j&q=&esrc=s&frm=1&source=web&cd=7&cad=rja&ved=0CFYQFjAG&url=http%3A%2F%2Fpfiffner.gmu.edu%2Ffiles%2Fpdfs%2FArticles%2FCPA%2520Orders%2C%2520Iraq%2520PDF.pdf&ei=C_0AU6KADOKQyQG55YCoBw&usg=AFQjCNFsvxEfHlbDPzdR_L3NH57YWIwakw (accessed February 16, 2014).

[19]Administrator, Coalition Provisional Authority, Coalition Providional Authority Order Number 75, "Realignment of Military Industrial Companies," http://www.iraqcoalition.org/regulations/20040420_CPAORD_75_Realignment_of_Military_Industrial_Companies__with_Annex_A.pdf (accessed February 16, 2014).

[20]Eric Schmitt and Joel Brinkley, "The Struggle for Iraq: Planning; State Dept. Study Foresaw Trouble Now Plaguing Iraq," *The New York Times*, November 24, 2011, http://www.nytimes.com/2003/10/19/world/struggle-for-iraq-planning-state-dept-study-foresaw-trouble-now-plaguing-iraq.html (accessed February 16, 2014).

[21]U.S. Department of State, Oil and Energy Working Group, "The Future of Iraq Project," April 20, 2003, The George Washington University, http://www.google.com/url?sa=t&rct=j&q=&esrc=s&frm=1&source=web&cd=2&cad=rja&sqi=2&ved=0CCsQFjAB&url=http%3A%2F%2Fwww2.gwu.edu%2F~nsarchiv%2FNSAEBB%2FNSAEBB198%2FFOI%2520Oil.pdf&ei=NP8AU46uO6ab2QWf04HoDw&usg=AFQjCNFLTdmq27B8jYJbBLW0W0IOhRJpvg (accessed February 16, 2014).

[22]Rajiv Chandrasekaran, *Imperial Life in the Emerald City* (New York: Random House, 2006), 37.

[23]Ibid.

[24]Smallwood and Liimatainen.

CHAPTER 3

RESEARCH METHODOLOGY

This study attempts to answer what responsibility the United States has to plan and implement programs to address the disposition of conventional arms manufacturers in post-conflict or failed-state environments. The answer to this question will be of interest to the National Security Council staff who advise the president on threats to United States national security interests. It will similarly be of value to senior military officials who will plan military operations in future conflict areas or failed-state environments, and all of those who may find themselves implementing United States foreign policy or conducting stability operations in such environments. Given that such expertise is highly attractive to violent non-state actors, this study will also be of interest to those involved in counter-terrorism programs.

The research methodology chosen for this thesis is a qualitative methodology, using a case study research design. The research is based on a collective case study[1] analysis of United States policies toward those involved in weapons' manufacturing programs in post-WWII Germany, the FSU at the conclusion of the Cold War, and post-2003 Iraq. Although thought was given to limiting the number of cases in this thesis to one (in an effort to go into more depth), in selecting multiple cases for study, the researcher hopes to emphasize the fact that the topic being studied is not an isolated event in history. To the contrary, given historical precedent and the presence of multiple unstable countries with defense industrial programs, there is high potential for the United States to face similar challenges again in the future.

The researcher began collecting data on this topic in 2004, while employed by the Department of Defense and tasked with studying Iraq's defense industry after the 2003 invasion. An effort was made to identify where, if at all, the United States had previously encountered a similar dilemma. This led to the identification of the two additional case studies (post-WWII Germany and FSU) contained in this manuscript. In addition to having direct personal observation of the events which unfolded in Iraq, the researcher has collected the memoirs of direct participants, historical documents and books, and think-tank analyses to develop an understanding of United States policies in post-WWII Germany and the FSU. The researcher has previously authored articles related to this subject in published magazines and continues to acquire professional experience on this topic as a Department of Defense employee.

A cross-case analysis[2] will be conducted in the following chapter. The method used to conduct such analysis is based on Arthur F. Lykke's model of Strategy being the sum of Ends, Ways, and Means.[3] Lykke's model is described as strategy being the way in which leadership will use its means or resources to exercise control over sets of circumstances to achieve objectives, or ends which support state interests.[4] Applying Lykke's model to this research, in each case study the researcher identifies the desired United States end-state (Ends), broadly characterizes how the United States intended to get there (Ways), and highlights who was responsible for implementation (Means). The researcher will also include a general description of the target audience in each case along with the actual end-state.

After identifying the Ends, Ways, and Means of United States policy in each case, the researcher then identifies instances where United States policy has been consistent

across each case and where it diverged. The intent in adopting this method is to derive

insights that may be applicable in the future, even though each future case will almost

certainly present unique challenges. To illustrate this last point, the researcher looks at

how historical policies would or would not fit in a hypothetical post-conflict Iran and

then identifies a challenge that Iran would present which was not encountered in previous

instances. The table below sets the stage for a cross-case analysis, conducted in the next

chapter.

Table 2.	Ends, Ways, and Means of U.S. Policy Towards Defense Industrial Workers in Post-WWII Germany, the Former Soviet Union, and Post-2003 Iraq		
	Post-WWII Germany	Former Soviet Union	Post Invasion Iraq
Target Audience	Senior German STE employed throughout defense industry	Senior WMD scientists and engineers	Senior WMD scientists and engineers
U.S. Desired End-State	Reduced German capability; U.S. advantage over Soviet Union	Dangerous expertise remains in FSU (prevent proliferation) and FSU has reduced WMD capability	WMD expertise safeguarded from other nation states and non-state actors
Policy	Recruited scientists and engineers; denied expertise to Soviet Union; reduced German war-making capability	Cooperative Threat Reduction program created	Scientist redirection / engagement (WMD focused)
Key Players Tasked with Implementation	U.S. military and intelligence	Various government agencies and federal contractors	Various government agencies and federal contractors
Actual End-State	U.S. and Soviet Union acquired expertise; birth of Cold War arms race	Soviet WMD arsenal reduced; few defense industries successfully converted for civilian use; evidence of proliferation of Soviet expertise	~50,000 MIC personnel unemployed; high demand for their expertise by violent non-state actors; improvised explosive device used on previously unseen scale

Source: Created by author.

The table above summarizes the desired and actual end-states in each case study, along with the ways the United States hoped to achieve the desired end-state (policy), and the means by which it would be accomplished (key players). This not only helps provide a departure point for further analysis of the historical case studies, but also facilitates discussion on future programs. What is immediately apparent is the maturation of policy in the FSU and Iraq case studies because of the creation of Cooperative Threat Reduction. At the same time however, the target audience (WMD personnel) was more narrowly focused when compared to the Germany case study, which included all sectors of defense industry. This point will be further explored in the following chapters, as today's non-state actors are interested not just in acquiring WMD expertise, but more frequently in leveraging the expertise of conventional weapons' experts to produce improvised weapons. Aware of this new development, analysis and discussion can commence on what responsibility the United States has to plan and implement programs for conventional weapons' STE in future post-conflict or failed-state environments.

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[1]John W. Creswell, *Qualitative Inquiry and Research Design: Choosing Among Five Approaches* (Los Angeles: SAGE Publications, 2013), 99.

[2]Ibid., 101.

[3]Arthur F. Lykke, Jr., "Toward an Understanding of Military Strategy," in *Military Strategy: Theory and Application* (Carlisle Barracks, PA: U.S. Army War College, 1989), 3-8.

[4]H. Richard Yarger, "Towards A Theory of Strategy: Art Lykke and the Army War College Strategy Model," The Air University, www.au.af.mil/au/awc/awcgate/army-usawc/stratpap.htm (accessed February 22, 2014).

CHAPTER 4

ANALYSIS

The focus of this research is to determine what responsibility the United States

has to plan and implement programs to address the disposition of conventional arms

manufacturers in post-conflict or failed-state environments. To answer this question, the

researcher conducted a cross-case analysis, looking at the ends, ways, and means of

United States policy towards weapons' STE in Germany at the end of WWII; the FSU

after its collapse; and Iraq following the 2003 invasion. In doing so, trends and

differences between the cases became apparent. These will no doubt prove useful in

future cases where the United States decides where and when to act when large numbers

of arms manufacturers find themselves unemployed and at heightened risk for

recruitment. However, as will be discussed later, one should recognize that while insights

derived from history will likely prove useful, one should not dismiss the fact that each

future case will almost certainly have its own challenges. To illustrate this last point, the

researcher briefly discusses a unique challenge the United States would face in a

hypothetical post-conflict or failed-state Iran.

Ends (Desired)

There is one consistency across each of the three case studies examined in this

research. This is reflected by the desired end-state, which consisted of a desire to mitigate

a strategic threat to the national security of the United States. In Germany, Washington

correctly recognized that a failure to pay attention to the futures of German weapons'

STE would result in the Soviet Union acquiring their expertise and harnessing it to

further Soviet weapons' programs. There was no differentiation made between those who worked in WMD programs versus conventional arms manufacturing programs; because Germany had a technological capability equal to (or in some cases greater than) the United States, efforts to secure such expertise and deny it to the Soviet Union were all-inclusive.

Decades later, following the collapse of the Soviet Union, the strategic threat Washington faced was the proliferation of WMD (and associated long-range delivery systems) to both other potentially hostile nation-states and non-state actors. With this in mind, Washington identified as its desired end-state, the prevention of "proliferation of WMD and related materials, technologies and expertise from former Soviet Union States."[1] In this case, there was little emphasis placed on conventional weapons' manufacturing expertise. This is likely due to the sheer size of the FSU's military industrial complex and the lack of a large, hostile non-state actor footprint within former Soviet bloc countries. Given the fact that Soviet weapons programs employed millions of workers, it would not have been possible to embark on a program to ensure that all of those who lost their jobs transitioned successfully to peaceful employment.

Similar to the policy developed for the FSU, following the 2003 United States invasion of Iraq, Washington recognized a strategic threat posed by a relatively small cadre of Iraq's senior WMD STE and the possibility that they could be enticed to sell their expertise abroad, or to non-state actors. Drawing on experience, Washington established a scientist redirection program with the goal of preventing Iraq's WMD experts from proliferating their knowledge. Once again, no attention was paid to conventional arms manufacturers employed in Iraq's MIC. What Washington did not

anticipate was a surge in the number of non-state actors in the aftermath of the war and the dramatic increase in demand for conventional arms manufacturing expertise that could be used to produce improvised weapons.

Ends (Actual)

Despite efforts to acquire German expertise, while simultaneously denying such expertise to the Soviet Union, the United States was ultimately unsuccessful in achieving its desired end-state at the end of WWII. It is undeniable that the United States secured a great deal of valuable German expertise that helped advance United States defense programs. However, the Soviet Union implemented a program similar to the United States Paperlcip and Alsos missions. Under Operation Osoaviakhim, the Soviets loaded thousands of German weapons experts onto trains and shipped them back to the Soviet Union. Among those who were relocated was German missile expert Helmut Goerttrup, whose wife documented the experience in a diary that was later published. Her account of being carted off on a train in the middle of the night is consistent with historian Norman Naimark's account as noted in his book, *The Russians in Germany*.

Detailed data on the numbers of Soviet STE who proliferated their knowledge abroad during the early 1990s after the collapse of the Soviet Union is simply not available. One account claims that at least 3,000 Russian scientists with WMD expertise have left the country since 1992.[2] North Korea reportedly secured the services of approximately 160 Russian missile specialists and nuclear scientists.[3] Moreover, the detention of approximately 60 Russian missile experts (bound for North Korea) at a Moscow airport provides further evidence that attempts to proliferate knowledge were made.[4] Given the sheer size of the Soviet defense industrial complex, it would be a

mistake to believe that CTR efforts to keep Soviet STE from proliferating knowledge were completely successful. However, this is not to suggest that CTR programs were ineffective there.

As is the case with WMD-associated personnel of the FSU, detailed data on the proliferation of Iraqi WMD expertise is unavailable. However, an Iraqi nuclear expert previously employed in Saddam's nuclear weapons program confirmed that there were some cases where scientists left Iraq.[5] Moreover, there are multiple reports of Iraqis with general chemical or biological expertise helping insurgents produce chemical and biological agents.[6] Still, just as in the FSU, redirection efforts likely enjoyed some success in keeping Iraq's top experts in Iraq and less susceptible to insurgent or terrorist recruitment efforts. What was not considered in the context of strategic threat was that of non-state actor access to tens of thousands of suddenly unemployed conventional arms manufacturers from Iraq's MIC. Although these individuals were not part of the CTR mission in Iraq, one cannot ignore this as part of the actual end-state. Given the scale in which improvised weapons have been employed by non-state actors, not just in Iraq, but across the Middle East and Northern Africa over the past decade, one can make a strong argument that a new type of strategic threat has emerged.

<u>Ways</u>

The ways in which the United States has attempted to reach its desired end-state have been consistent over the past two decades (the result of CTR being created as a formal program) in the FSU and Iraq. However, they are vastly different from the way the United States handled German STE after WWII. In Germany, United States policy can be generally characterized as one of recruit and punish. When military officials

identified a German scientist or engineer who possessed desired knowledge, it relocated him to the United States. At the same time, because of the Morgenthau Plan, severe restrictions were placed on German industry to ensure that Germany would be unable to wage war again in the future. Arguments made by men such as Cordell Hull who suggested this would result in the bitter resentment of the United States by the German people were ignored. Defense industries were closed and strict limits were established on the production of strategic materials such as steel. United States policy only shifted and became more lenient when it became clear that this was necessary to stave off the spread of communism.

In both the FSU and Iraq, CTR was the way in which the United States hoped to achieve its desired end-state. As described above, CTR is an umbrella program, under which multiple initiatives have been utilized to combat proliferation. In the Soviet Union, CTR activities included scientist redirection, destruction of WMD and associated infrastructure, and defense conversion. In Iraq, CTR activities were limited predominantly to scientist redirection.

In 2009, the NAS published a report on the need to upgrade and expand CTR to meet future challenges. Dubbed CTR 2.0, the NAS recommended that the programs "must be expanded to other regions and fundamentally redesigned as an active tool of foreign policy that can address contemporary threats from groups that are agile, networked, and adaptable."[7] The report generally suggests that future programs need to be more flexible, expansive, and responsive. Finally, it recommends looking beyond government funded programs as the only solution and increasing the role of the private sector.

<u>Means</u>

In post-WWII Germany, military intelligence officials were responsible for implementing Project Paperclip and the Alsos Mission. The Joint Intelligence Objectives Agency (created in 1945 as subcommittee of the Joint Intelligence Committee was responsible for Paperclip and was composed of a representative of each member of the Joint Intelligence Committee, along with intelligence officers from each uniformed service.[8] It was responsible for producing intelligence on German science, scientists, and industry that was then given to military officials to aid them in their search across Germany. The Alsos Mission was reportedly the brainchild of U.S. Army General George Marshall.[9] Overseen in the field by an Army lieutenant colonel and a team of military intelligence officials, the Alsos Mission included a number of civilian scientists who were used to determine which German scientists and what German science was most valuable.[10]

As was the case in examining the ways in which the United States attempted to reach its desired end-state, the means have been consistent over the past two decades with the creation of CTR. Government agencies and officials, along with federal contractors have been utilized exclusively to implement CTR programs. What this fundamentally means is that CTR is paid for by U.S. tax dollars—this has sometimes received criticism. For example, according to a Henry L. Stimson Center study, the scientist engagement model "must be complemented by a new model that is based on the creation of incentives for private companies . . . as opposed to the unsustainable government patronage that constitutes the current approach."[11] This call for an increased role by the private sector is consistent with the NAS recommendation, and it seems likely that future CTR initiatives

will look towards private companies as a means of creating long-term sustainable employment for WMD STE.

Emergence of a New Strategic Threat

As demonstrated by the post-WWII Germany case study, the need to develop post-war policy for weapons' production experts is not new to Washington. United States policy has come a long way since the 1940s, when German experts were quietly captured and shipped back to the United States and German factories were dismantled. When the collapse of the Soviet Union created similar challenges, CTR programs were created to assist those with dangerous expertise in their transition to stable, civilian positions where they would not pose a proliferation threat. A similar program was implemented in Iraq to safeguard WMD expertise and ensure it did not fall into the hands of non-state actors. In Iraq, however, Washington faced a threat not previously encountered.

Iraq was unique in that the sudden unemployment of tens of thousands of defense industrialists occurred concurrently with the beginning of what became a large-scale insurgency, along with the influx of foreign fighters and terrorist organizations. Although the need to secure WMD expertise was important, the need to secure conventional arms manufacturing expertise became equally so, as the market for such expertise skyrocketed with the beginning of the insurgency. The United States had not foreseen the possibility of a developing insurgency and the market this would provide for defense industrial workers who believed the Americans were responsible for their sudden unemployment. To be fair, a significant, but unquantifiable amount of lethal aid (to include weapons production knowledge) came in from neighboring states, such as Iran. For example, it is quite clear that Iran was involved in introducing improvised rocket-assisted mortars and

explosively formed penetrators to the battlefield in Iraq.[12] However, one should not ignore the contributions made by the thousands of unemployed Iraqi weapons-makers.

In many ways, Iraq's defense industrialists possessed the perfect skills desired by insurgents and terrorist organizations. Maintaining any military production capability in the face of years of United Nations sanctions required perseverance and ingenuity. Here the Iraqis were not lacking. As just one example of the Iraqi's ability to improvise, during the 1990s, Iraqi engineers clustered surface-to-air missile engines in an attempt to produce longer-range surface-to-surface missiles.[13] Improvisation and cannibalization of production lines were commonplace in Iraq during the years preceding Operation Iraqi Freedom. Moreover, limited evidence suggests that Saddam Hussein and his closest associates anticipated the unconventional fight which occurred in Iraq following the 2003 invasion.

In a video captured by United States forces and apparently made just several months before the invasion, Saddam Hussein met with several of his top advisors, including the Minister of Iraq's MIC, 'Abd-al-Tawab Mullah Huwaysh. In the video, Huwaysh presented numerous homemade weapons, including crossbows, Molotov cocktails, slingshots, and metal spikes to destroy the tires of passing vehicles. Saddam, clearly pleased with what he saw, urged Huwaysh and his officers to ensure that the primitive weapons made it into the hands of the resistance. Huwaysh was even quoted in the video as saying that while there were hundreds of ideas out there for weapons production, he liked designs that could be manufactured with items found around the house.[14]

Given the primitive nature of the weapons found in the video, one might argue that anyone could have manufactured them. However, one should not dismiss the fact that it was those employed in Iraq's defense industry who came up with such ideas. Nor should one ignore the fact that although weapons portrayed in the video were primitive, improvised weapons became increasingly more sophisticated as the war in Iraq progressed. The key point to take away here is that evidence suggests that Iraq was prepared to fight an unconventional war with improvised weapons developed by those who had experience working in conventional weapons factories.

In the months following the 2003 invasion, Iraq's MIC employees watched as their factories sat idle and were slowly destroyed by looters. They continued to wait and see what the CPA was going to do about their situation. A year later, they received the news that the vast majority would be placed under the Ministry of Finance, with no work and little pay. The fact that the insurgency did not occur immediately after the invasion suggests that the Iraqis were waiting to see how the United States would implement its post-war policies under the CPA. This further suggests that, although MIC workers may have been prepared to support an insurgency, it was their treatment under the CPA that made them more vulnerable to recruitment.

Iraq Was Not an Isolated Experience

The use of improvised or homemade weapons by large non-state actor groups is not an isolated experience unique to Iraq. For example, according to a September 2012 Joint Improvised Explosive Device Defeat Organization report, from January 2011 to September 2012, there were more than 10,000 IED events that occurred in 112 countries, executed by more than 40 different groups.[15] Clearly, the market for weapons-

manufacturing expertise by such groups has only grown over the past decade. The international media has reported extensively on the use of improvised weapons by rebels in such states as Libya and Syria. *New York Times* journalist Chris Chivers, in particular, has reported on this trend in the Times' At War blog. For example, in a September 2012 article, Chivers highlights the "development of local arms-producing industries in Syrian cities and the countryside," claiming that given the absence of support from the West, Syrian rebels have "undertaken the production of materiel for guerrilla war."[16] This was no different from Chivers' reporting from Libya in 2011. There, Chivers reported on "a clandestine network of rebel workshops, where . . . makeshift weapons have been designed, assembled and pushed out."[17] While those involved in weapons production efforts in Syria and Libya came from assorted backgrounds, reports indicate that those with arms production skills made key contributions.[18]

The past decade provides compelling evidence that a new strategic threat to United States national security interests has emerged. Gone are the days where Washington can afford to worry exclusively about the proliferation of a certain kind of highly dangerous knowledge (WMD). Today, those with experience working in conventional arms production programs have expertise highly desired by a growing number of violent non-state groups and it is reasonable to assume that our forces will continue to face an unconventional threat similar to that seen in Iraq in the future.

United States Response to the IED Threat

Because of IED attacks, billions of dollars have been spent on uparmored vehicles, IED countermeasure technologies, the establishment of entirely new organizations (i.e. the Joint IED Defeat Organization), and expansion across the

Intelligence Community.[19] Yet research does not suggest that any serious thought has been given to offering those with experience working in weapons programs an alternative to selling their expertise to non-state actors. Even the 2013 White House Counter-IED policy overlooks the importance of providing such an alternative, as demonstrated in its eight "priority capabilities" and "enabling technologies."[20]

Table 3.   Counter-IED Priority Capabilities
and Enabling Technologies

1. Increasing Domestic and International Engagement

2. Effectively Exploiting Information and Materials from IED Attacks

3. Advancing Our Intelligence and Information Analysis

4. Maintaining Our Deployable Counter-IED Resources

5. Screening, Detecting, and Protecting Our People, Facilities, Transportation Systems, Critical Infrastructure, as well as the Flow of Legitimate Commerce

6. Safeguarding Explosives and Select Precursor Materials

7. Coordinating and Standardizing Training and Equipment

8. Enhancing Our Operational Planning

Source: U.S. President, "Countering Improvised Explosive Devices," February 26, 2011, The White House, http://www.google.com/url?sa=t&rct=j&q=&esrc=s&frm= 1&source=web&cd=1&cad=rja&uact=8&ved=0CCYQFjAA&url=http%3A%2F%2Fww w.whitehouse.gov%2Fsites%2Fdefault%2Ffiles%2Fdocs%2Fcied_1.pdf&ei=HqRSU9T HArP98AGO_ID4CA&usg=AFQjCNHj-1AJ1qkUAGpgMouSqfyX2m-Qlw (accessed April 19, 2014).

The White House priority capabilities and enabling technologies focus on safeguarding materials and facilities, improving intelligence/monitoring capabilities and improving post-blast forensics. Careful examination indicates that the strategy is more reactive in nature, focusing more on defeating the IED and attacking the network after it is created rather than looking at the potential motivations of those who decide to join the network. Nowhere does the policy consider such things as offering those with dangerous expertise an alternative to working with non-state actors. Counter-IED strategy will remain relevant in the future, where United States soldiers find themselves on the ground trying to win a battle against a technologically inferior enemy.

Looking Forward: Considerations for a Hypothetical Post-Conflict or Failed-State Iran

At present, there are multiple countries (e.g. Iran, North Korea, and Pakistan) where the development of post-conflict or failed-state plans and policies for defense industrialists would be prudent. It is reasonable to assume that in each case, a market will exist for suddenly unemployed weapons' experts with dangerous expertise. Iran provides a particularly salient case worthy of further analysis.

Iran's defense industrial complex is widely considered the most capable in the Middle East (not counting Israel). This was not always the case. During the Iran-Iraq War from 1980-1988, Iran's military manufacturing capability was inferior to that of Iraq. Tehran relied heavily on arms imports, which were unreliable and costly. As one account noted, "even when it was able to acquire the weapons and spare parts that it needed on the open market, Iran was gouged on prices for Western equipment and usually paid twice the fair market value."[21]

Because of Tehran's inferior military manufacturing capability and the unreliability of arms imports during the war, Iranian commanders often resorted to "human wave attacks" emphasizing a "fanatical devotion to Islam."[22] The senseless slaughter of adolescent Iranians (Basij Forces) during such attacks was the result of a strategy developed to make up for weapon and technology shortfalls. This changed towards the end of the war when "much of the Iranian military bureaucracy and officer corps that came to power during the mid-1980s at the height of the war . . . [had] come to appreciate the impact that technology [had] on the battlefield."[23] Military officials had finally reached an appreciation for domestic production of arms.

After the war, Iran embarked on a vigorous effort to develop its own military manufacturing capability. This has been reinforced over the years by the implementation of sanctions on Iran, which ban arms exports to the country. The concept of self-sufficiency in military production is firmly grounded in the Iranian culture. In fact, "self-sufficiency" units were created within the Islamic Revolutionary Guard Corps to tackle the challenge of improving domestic arms production.

The extent of progress in Iranian arms production since the Iran-Iraq War is perhaps best illustrated by the career of Iranian General Hassan Tehrani Moghaddam. During the Iran-Iraq War, Moghaddam was tasked to form the Islamic Revolutionary Guard Corps's first artillery unit, using cannons seized from the Iraqi army. Moghaddam eventually led efforts to reverse engineer Scud missiles in order to develop a domestic ballistic missile production capability in Iran.[24] He has been described as the father of Iran's missile programs.[25]

In November 2011, Moghaddam died in a massive explosion at an Islamic

Revolutionary Guard Corps facility west of Tehran. There are a number of different

explanations for what caused the explosion and multiple accounts for the type of work

conducted at the facility. Not least among these is that Moghaddam was working on a

project to develop an intercontinental ballistic missile, capable of striking the United

States.[26]

Regardless of whether Moghaddam was working on an intercontinental ballistic

missile, or something entirely different, to go from not having an ability to domestically

produce artillery systems to being able to produce ballistic missiles in a period of 30

years is not only impressive, but demonstrative of the emphasis Tehran has placed on

developing a self-sufficient military industrial complex. The fact that this was done under

international sanctions only further emphasizes this point. We should expect that just as

sanctions on Iraq's MIC strengthened its employees ability improvise, Iran's arms

manufacturers have likely experienced a similar dynamic. What Moghaddam's story

helps illustrate is the scale of the problem the United States would face in a hypothetical

post-conflict/failed-state Iran. Unlike Iraq's faltering defense industries, Iran's military

industrial complex is modern and highly capable with advanced weapons technologies.

While Moghaddam's story provides a good idea of the scale of the problem the

United States would face, the scope of the problem is best illustrated by looking at Iran's

Ministry of Defense and Armed Forces Logistics. The Ministry of Defense and Armed

Forces Logistics is the parent organization under which all Iranian defense industries fall.

Iran has progressed across all sectors since the Iran-Iraq War. Tehran is now capable of

producing main battle tanks, armored personnel vehicles, howitzers, multi-barrel rocket

launchers, anti-tank missiles, small arms, an assortment of ammunition, machine guns, ballistic missiles, fast patrol boats, and mines and explosives.[27] Details on the total number of Iranians involved in defense production are not readily available. However, if one considers that Iraq's MIC employed some 60,000 Iraqis at the beginning of 2003, and that Iran is now believed to have a capability superior to that of Iraq a decade ago, the numbers are likely equal to or greater than 60,000. This gives one a sense of the scope of the problem associated with the post-conflict/failed-state treatment of those currently employed in Iran's defense industries.

With history providing justification for the need to address unemployed defense industry workers in post-conflict/failed-state environments; insights on how the United States has responded to historical case studies; and a sense of the potential problem Iran would pose, one can begin to develop a framework to address the problem. However, before doing so, two additional factors (not encountered in the three historical case studies) must be considered which could play a major role in the post-conflict/failed-state actions of defense industrialists.

Iran is unique in that a hardline religious ideology and a hatred for the west influenced the thinking of a large percentage of Iranian society. This will make defense conversion or scientist redirection-like activities difficult to implement. For example, the gravestone of Hassan Tehrani Moghaddam reportedly reads, "here is the grave of a man who wanted to destroy Israel."[28] While one must acknowledge that this ideology will make many Iranian scientists and engineers less likely to cooperate, we should not assume that all of those employed in Iran's defense industries share the same ideology. Some may only be espousing the ideology to keep their job and privileges. If an attractive

alternative to working with the insurgency is provided, many may opt to take it. This implies that in a future failed-state or post-conflict Iran a hybrid strategy of counter-terrorism and CTR-like activities would be necessary.

Another factor which should be considered is that Iran has had the opportunity to closely watch how insurgents fought against United States forces in Iraq with improvised weapons and how, ultimately the United States left without a clear and decisive victory. It would be irresponsible to think that Iran has not already conducted a careful after-action study of the war in Iraq and that it has not carefully included it in their national military strategy. One should also remember that Iran's provision of lethal aid to Iraq during the war demonstrates Iran's understanding of the importance of the role played by insurgents armed with improvised weapons.

United States Responsibilities and a Framework for Action

In all three of the case studies examined in this research, the United States acknowledged that there was a strategic threat to its interests and it responded, suggesting that where the United States sees a strategic threat in the future, it will similarly take action. Therefore, if the United States recognizes a strategic threat posed by large-scale, violent non-state actor recruitment of defense industrialists in a future failed-state or post-conflict environment, it must be prepared to respond.

Ends, Ways, Means

Returning to Lykke's model, the first question that asked should be: What is the desired end-state? The United States desired end-state in failed-state or post-conflict environments will vary according to realities of what is possible on the ground. However,

it is fair to suggest that such an environment should promote long-term stability and no longer present a threat to the United States and its strategic interests, host nation citizens, and regional security. Presumably, such environments would include those in which non-state actors are prevented from large-scale recruitment of weapon's manufacturers. Unfortunately roughly scratching out a desired end-state is the easiest part of Lykke's model, as the ways and means to do this are much more difficult.

In looking at the ways, an alternative to working with the insurgency must be provided to those on the supply side (conventional weapons STE), while military operations need to be focused on eliminating those on the demand side (violent non-state actors). This needs to be taken into account at all three levels of war (strategic, operational, and tactical) and must be carried out using a whole-of-government approach. Discussion below focuses on provision of an alternative on the supply side, as the need for military operations to eliminate the violent non-state actor threat is already widely accepted and practiced.

If one accepts that an alternative to working with an insurgency must be provided for at-risk weapons' STE in a post-conflict or failed-state environment, then this should be part of the early planning process and requires consideration at the highest levels of the United States government. Using Iraq as an example, no efforts were made to protect MIC factories, which were eventually destroyed, or rendered non-viable by looting. Had there been awareness at the strategic level of the importance of providing employment for Iraq's defense industrialists prior to the invasion, MIC factories would have likely been protected by troops in the field. This would have set the stage for defense conversion and provided an alternative to supporting the insurgency for Iraq's weapons STE.

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Although there needs to be awareness at the strategic level on the importance of protecting the livelihoods of those with dangerous expertise, military commanders must also understand this. The military does an excellent job of identifying the need to protect critical infrastructure during operations, but all too often, this is limited to the infrastructure that provides essential services. Protection of those places such as defense industrial enterprises, which provide employment to the masses, has typically not been in the scheme of maneuver. Tactical actions such as the protection of places that provide employment would facilitate action by other organizations across the United States government and do much to contribute toward reducing unemployment and improving stability.

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Cooperative Threat Reduction and Its Potential
Role in Addressing the Problem

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In its 2009 report, "Global Security Engagement: A New Model for Cooperative Threat Reduction," the authors answered a number of questions put forth to them by Congress. The authors were asked to find ways for strengthening CTR, to find new CTR initiatives, and to provide their judgment about the future of CTR. Although the committee may not have intended for future CTR programs to be used to address the threat identified in this research, the author argues that the CTR concepts and practices already in-place, or envisioned are just what is needed.[29]

Authors of the report correctly identify the fact that the world now faces some very different security challenges than those for which CTR was created to address. They further state that the original program was designed "to deal with yesterday's strategic weapons."[30] Indeed, proliferation of WMD was a grave threat and of global concern

during the collapse of the Soviet Union. However, many of the same concepts and practices established and refined under the CTR umbrella over the past 20 years are applicable to providing an alternative to at-risk conventional arms manufacturers. Defense conversion and redirection, in particular, are just what is needed to address the new strategic threat identified in this paper. Although defense conversion did not necessarily work in the sprawling landscape of the Soviet military industrial complex, in Iraq this might have worked quite well. Converting MIC factories to civil production and retraining its weapons producers to peaceful endeavors would have shown a commitment to their futures, given them hope, and provided an alternative to working with the insurgency. Even if not all efforts were completely successful, the effort may have gone a long way towards preventing their bitter resentment.

Some may argue that even in Iraq, the process of converting their defense industry to a viable civil sector capable of manufacturing products competitive with imports would have been impossible, given the enormity of resources required. However, once again, suggestions made by the authors of the NAS report make such a theory plausible, for they argue that CTR of the future needs to be a burden shared by a much more inclusive community of "government, academe, industry, nongovernmental organizations and individuals" and multi-national partners.[31] Furthermore, the authors recommended "program planning should be developed out of a strategic process and be matched by a strategic budget process that produces a multiyear budget plan and distributes funding across agencies based on agency ability."[32] In short, the involvement of so many public, private, and multi-national entities would help eliminate the often criticized practice of providing unlimited government patronage with no clear exit strategy. If the United

States, its foreign partners, and the host nation government work to create the necessary conditions (political, legal, and security), profit-driven private sector corporations (from both the host-nation and the international community) can take a prominent role.

As much as future CTR programs may present a viable solution to the threat posed herein, some CTR officials may be less than enthusiastic about getting involved. As CTR programs were created to respond to a strategic WMD threat, the inclusion of initiatives which address threats posed by conventional weapons would expectedly compete for a finite amount of resources. However, there is reason to believe that some involved in nonproliferation work may not be so opposed. As mentioned above, the NAS report's language does seem to indicate that the program should expand to address a broader range of threats, beyond those of yesterday's strategic weapons. For instance, the report's authors suggest that future CTR programs, or CTR 2.0, should "prevent, reduce, mitigate, or eliminate common threats to U.S. national security and global stability that have emerged in particular since the end of the Cold War."[33] Nowhere in the definition of CTR 2.0 does it imply that future cooperative threat reduction programs must be restricted exclusively to threats posed by WMD. CTR officials should not quickly dismiss the idea of leveraging their capabilities against the threat identified in this research and further study and consideration should be given to the conclusions and recommendations that follow.

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CHAPTER 5

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

The United States has shown a firm commitment in keeping weapons out of the

hands of violent non-state actors. This commitment is reflected in programs such as CTR,

in organizations such as the Department of State's Bureau of Arms Control, Verification,

and Compliance, and in actions such as the recent signing of the United Nations' Arms

Trade Treaty. However, such programs, organizations, and initiatives do not address the

threat posed by violent non-state actors armed with improvised weapons—a trend that

has grown in the post-9/11 era—and now constitutes a new strategic threat.

This research does not suggest that the United States or the global community will

be able to keep all conventional weapons STE from providing their expertise to terrorists,

insurgents, criminals, etc. Those who are compelled to share their expertise for

ideological reasons will continue to do so. However, in post-conflict/failed-state

environments where there is a significant population of suddenly unemployed individuals

with dangerous expertise, the United States must act. Such actions would complement,

and be fully consistent with long-standing arms control and nonproliferation efforts.

The United States missed an opportunity to act in Iraq after the 2003 invasion,

when conventional weapons STE sat idle and watched their factories rendered inoperable

by looters. While the Department of State's "Future of Iraq Project" did recognize the

need to address the postwar disposition of MIC employees, this was lost when the

Department of Defense gained responsibility for post-conflict operations. It seems the

Department of Defense simply overlooked the MIC issue during its first year in Iraq, as

no determination on MIC's future was made until April 2004. Such ignorance had grave consequences that continue even today. The United States cannot afford to make similar mistakes in post-conflict/failed-state environments of the future.

The United States Cooperative Threat Reduction program is ideally suited to respond to the threat identified in this paper. In particular, defense conversion and scientist redirection would give conventional weapons STE an alternative to selling their expertise to violent non-state actors. With this in mind, the United States should consider expanding the scope of the program beyond the WMD threat and include conventional weapons and associated expertise. The author considers this last point the most important of the recommendations made below.

Recommendations

In the future, the President and members of the National Security Council should take the presence of a military industrial complex into consideration as they contemplate taking military action or action in a failed-state. Protection of defense industrial enterprises and assistance in converting them to peaceful production will protect the livelihoods of those with dangerous expertise and offer them an alternative to turning to non-state actors. Such considerations will influence strategic decisions such as the number of troops needed to accomplish strategic objectives and the amount of financial assistance needed to conduct the transition from defense production to civilian production.

At the operational and tactical levels, military commanders and their staffs must develop a mindset where protection of critical infrastructure is not limited to those that provide essential services. Factories that provide employment to large numbers of people

must also be preserved. This implies that careful consideration needs to be given to defense industrial enterprises during Mission Analysis and Intelligence Preparation of the Battlespace in preparation for stability operations in post-conflict or failed-state environments.

As the United States military transitions to post-conflict operations or deploys to conduct stability operations in a failed-state environment, the presence of a military industrial complex should affect the United States strategic narrative, themes, and messages. Host nation scientists, technicians, and engineers will be anxiously waiting to see how United States actions will affect their ability to provide for their families. Reassuring them that the United States is committed to protecting their factories and working with them in some type of defense conversion program will decrease their motivation to join an insurgency.

United States policymakers should strongly consider expanding the scope of CTR to address threats posed by conventional weapons and associated expertise, as defense conversion and scientist redirection are ideally suited to respond to the threat identified in this research. There will be resistance to this recommendation based on how current CTR programs are resourced. To this, the author suggests that in future post-conflict environments, rather than spending tens of billions of dollars on the downstream activity of reconstruction, money could be better spent on the upstream activity of defense conversion and the redirection of STE to peaceful endeavors. In Iraq, it made little sense to spend more than $60 billion on reconstruction after allowing factories to be torn to the ground. Thus, in post-conflict/failed-state environments of the future where there exists a

defense industry, CTR initiatives should be sufficiently funded and given high priority within the National Security Council.

Areas of Future Research

There are a number of opportunities for further research on this topic. However, the author identifies two areas below which would be beneficial in the short term. The first area would be of benefit to those who plan and implement CTR programs in the future, while the second area would serve to reinforce the author's argument that a new strategic threat has emerged with non-state actor use of improvised weapons and their thirst for the expertise to manufacture them. The author intends to explore these areas in more depth later.

Although this research briefly mentions the work of Harry Kelly in post-WWII Japan and there is some literature devoted to his activities there, some details are notably missing. For example, we know that he was a champion of the revival of Japanese science. However, the specifics of how Japanese weapons' STE were converted to peaceful employment after the war is not readily available. Examples of where STE from specific weapons' factories were transitioned, along with the type of work they were converted to is missing. Further research on this topic would be of high value to those reshaping CTR programs of the future.

Further analysis of non-state actor recruitment of weapons' STE in Syria and Libya would also be helpful. While *New York Times* journalist Chris Chivers has reported extensively on the production of improvised weapons by non-state groups in each of those countries, it is not clear the extent to which those previously employed in defense industries have participated. It may prove difficult to obtain this information in an

unclassified realm, but journalists and other members of the international media would likely be able to obtain some additional data. This would be extremely valuable information for those studying this topic in detail.

Summary

The purpose of this research was twofold: (1) to bring attention to a new strategic threat posed by unemployed conventional weapons STE in post-conflict and failed-state environments; and (2) to argue that the United States has a responsibility to implement programs to mitigate such threats. The purpose was not to describe, in painstaking detail, the type of program(s) which should be implemented and who the key players should be. However, the author suggests that future CTR initiatives could be leveraged to address the threat highlighted herein. While nothing is certain, there is clearly potential for conflict with a defense-industrialized nation in the future, just as there is potential for the collapse of a country that maintains a military industrial complex. The United States must have a plan on how to respond should such a possibility become reality.

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